has been in operation at Baldwin, Kansas, since July 1, 1900, and the buildings for the primary or principal magnetic base station, situated at Cheltenham, Md., sixteen miles south-east of Washington, have been completed and the installation of the instruments is now taking place. Special declination readings from 7 a.m. to 4 p.m. have been made at Gaithersburg, Md., since March 22, 1900, and at Sitka, Alaska, since October 1, 1900. The sites for the magnetic base stations at Sitka, Alaska, and near Honolulu, Hawaiian Islands, have been determined and preparations made for the erection of the buildings. It will be the endeavour to have these magnetic observatories completed in time for co-operation with the proposed Antarctic expeditions.

Furthermore, special simultaneous observations have also been made on special days at various times, the purpose of these special observations being to determine over how large an area the variations, as recorded at the base stations, may be regarded as applying.

Again, various special investigations both of an experimental and a theoretical character have been undertaken, and considerable attention has been paid to the thorough training of observers and to the proper correlation of the various magnetic instruments. During the autumn of 1899 a set of coast survey magnetic instruments was compared with the standard instruments at the following foreign observatories: Kew, England; Potsdam, Germany; Pavlovsk, Russia; and Parc St. Maur, France.

The following publications have been issued, namely: Appendix 9, giving a general report of the magnetic survey of North Carolina; and Appendix 10, on the magnetic work of the U.S. Coast and Geodetic Survey, both appendices appearing in the Report of the Survey for 1898-99. Good progress has also been made with the new edition of the Coast Survey's magnetic declination tables and isogonic charts for the United States and Alaska for 1900.

MAX JOSEF VON PETTENKOFER.

It is with great regret that we record the death, in very sad circumstances, of the veteran German hygienist, Prof. Max von Pettenkofer. He was born in 1818, and was, therefore, in his eighty-third year at the time of his death.

Pettenkofer's name was known throughout the civilised world as that of the great professor of hygiene at Munich, and he made the Munich school famous. Among medical and hygienic circles in Europe he was personally well known and respected for his fearless defence of what he believed to be true and for the breadth of his views. Sometimes during a discussion on some subject on which he felt strongly, the burly form of the great German hygienist would arise, and with a few vigorous sentences he would scatter the arguments of his opponents like chaff before the wind. A notable instance of this occurred at the meeting of the International Congress of Hygiene and Demography at Vienna in 1887 during the discussion on quarantine; the supporters of that antiquated method of prevention had most of them aired their views, when Pettenkofer got up and brusquely told them that it was a question of cleanliness, that England had spent many millions in improving the sanitary condition of her towns and had now no fear of cholera, and that what other countries should do was to follow England's example, and then they would have no need for the vexatious and, for the most part, useless restrictions of quarantine.

Pettenkofer published a great many valuable papers on public health subjects; the list of their titles fills nearly a page and a half of the great "Index Catalogue of the Library of the Surgeon-General's Office, United States Army"; and even that is not complete, as it does not include his remarkable paper on "Die Immunität von Lyon gegen Cholera." But he was too busy with teaching the many pupils who flocked to him from all parts of the world, and with investigating, to write large treatises, two on cholera being the longest productions of his pen; this, indeed, was his favourite subject, and his books and papers on it number about a score, the best known of them probably being the one entitled "Boden- und Grundwasser in ihren Beziehungen zu Cholera und Typhus," in which he propounds his well-known theory that the spread of cholera and enteric fever depends upon the movements of the subsoil water, their prevalence increasing after a fall in the level of that water. This view he stoutly maintained, undaunted even by the fact that the City of Lyons (the invariable immunity of which from epidemics of cholera, in spite of several introductions of the disease, he considered quite explicable on his theory) was very subject to enteric fever, from which it ought, on the same theory, to be immune.

Whether, however, we regard his ground-water theory as correct or not, we cannot but admire the practical results of the measures taken under his advice to purify the subsoil of Munich, which, from being a hotbed of enteric fever, has become remarkably free from that disease.

He also wrote on sewerage arrangements, on the hygiene of ships, and on "the relations of the air to clothing, dwelling and soil," the last being a course of popular lectures; and he was co-editor of the *Zeitschrift für Biologie* (München) from 1865 to 1882.

Pettenkofer was much interested in chemical work connected with hygiene, and devised the method (ever since known by his name) of determining the percentage of carbonic acid in air, which has been adopted by all observers until quite recently.

Personally he was gentle and amiable, as a little incident will suffice to show. In 1894 the present writer, not finding him at the International Congress of Hygiene at Budapest, went to see him at his home at Seeshaupt, on the Starnberger See, near Munich; he was crossing on one of the steamers, and, when about half way towards the farther end of the lake, was surprised to meet Pettenkofer on board. The latter had gone some distance round the lake by rail and got on the steamer at one of the stopping places, so as to come part of the way to meet his guest for the day and escort him to his house.

Not having received the usual New Year's greetings from him on a card bearing a photograph of one of the fountains of the "Pettenkofer water supply" at Munich, with a small profile medallion of the professor above it, the writer feared that he was not well, but was little prepared for the terrible news which so soon followed.

It was no doubt his retirement, even at that lovely spot, and his forced inactivity, that preyed upon poor Pettenkofer's mind, and not even the patent of hereditary nobility granted him by the Emperor seems to have solaced him, for we have just received the melancholy and pathetic news that this grand old man, tortured by an incurable disease and wearied by his inability to work any more for the benefit of his fellow-men, has put an end to his sufferings by a pistol shot. W. H. C.

THE ROYAL INDIAN ENGINEERING COLLEGE, COOPERS HILL.

Last week we printed a report, taken from the daily papers, of the deputation to the Secretary of State for India asking for an inquiry into the working of the Royal Indian Engineering College. Lord Kelvin, who headed the deputation, expressed disappointment at the nature of Lord George Hamilton's reply, and if, in criticising that reply, we should fall into error in consequence of the inconsistencies in the reports of the interview, we must apologise to Lord George Hamilton beforehand if we should unintentionally misrepresent him.

The Secretary of State is of opinion that some of those who signed the memorial have been misled by *ex parte* statements; but the memorial was founded solely on the letters of dismissal and the memorial to the Secretary of State sent by the dismissed members of the staff. Lord George Hamilton seems to forget that Colonel Ottley's report is quite *ex parte*, for the staff have not only not had an opportunity of answering it, but they did not know of its existence until the reply of the Secretary of State was given.

We are assured that none of the letters to the daily papers were written by members of the staff, and the letters from the students were unanimously condemned by them.

Lord George Hamilton stated that Mr. (now Sir Henry) Fowler's committee of 1895, the composition of which it would be interesting to know, was of opinion that the number of the staff was out of all proportion to the number of the students, but we are very much mistaken if comparison with other institutions would not show that the number of the staff is by no means excessive. The numbers of the staff must depend more upon the variety of the subjects taught than upon the numbers of the students. In an engineering college especially, if it be worthy of the name, the variety must be considerable. The percentage of staff to students will decrease with the number of students; at Coopers Hill numbers of students are denied admission each year.

Until Colonel Ottley's report is published in full, it will be impossible to judge of the statement that it shows "a very unsatisfactory state of affairs at the College." That this is so is all the more surprising as the College is now self-supporting. More than this, year after year the Secretaries of State have spoken of the satisfactory state of the College when addressing the students on the prize days, and this after receiving the reports of the presidents.

The state of affairs is certainly unsatisfactory from one point of view. A college can no more get on without college meetings of the teaching staff than a Government can get on without Cabinet meetings of those in charge of different departments. Lord George Hamilton's reply indicates pretty clearly that while the teaching staff is never consulted, it is not quite certain whether the governing body is the Board of Visitors or the president of the College, who has made it quite clear that he knows nothing of educational methods.

It is impossible not to come to the conclusion that the main obstacle to improvement in the work at Coopers Hill has been the unsatisfactory position of the staff; they are entirely under the hands or the heel of the president, who may have had no experience whatever in matters of education. The staff are unable to forward recommendations to the India Office except through the president, and however much they may be desirous of improving the teaching, they are powerless.

There seems to be some misunderstanding about the teaching of electrical engineering. Some years ago several members of the staff urged the then president to introduce electrical engineering as a compulsory subject; the president would not further the proposal. It was next suggested that the subject should be made alternative with some of the other third year work; this was accepted, and since that time many students have worked at this subject for about fourteen weeks in their third year. Two of the members of the staff who are dismissed were instrumental in obtaining this concession from the president and the India Office. It is difficult to reconcile the desire to have electrical engineering as usory subject with the statement in the *Times* that, "with respect to electricity, the India Office had taken the opinion of Sir William Preece, and came to the conclusion that a demonstrator was capable of giving all the necessary instruction," unless it means that electrical engineering is to be taught as an art and not as a science, which will probably result in the students having an insufficient theoretical knowledge of the science they have to apply, and will certainly lead them into difficulties on an emergency.

The reference to Dr. Brightmore would lead a reader of the speech of Lord George Hamilton, as it appears in the papers, to think that he had been appointed recently to take the head of the engineering branch. Some of our readers will doubtless remember that Dr. Brightmore was appointed in September 1899 against the wishes of the late president, Colonel Pennycuick, and that his appointment was the principal cause of the resignation of that officer.

The statement that "the upshot of the whole matter would be this: there would be an increase in the hours of work in class and lecture from twenty-six to thirty-two" hours per week, is extremely misleading. A reference to the College time-tables would show that before the advent of Colonel Ottley the time of study for first year students was thirty-three hours a week, and for second year students thirty-four. At that time the third year students had in lecture only 14 hours 20 minutes; but no account is taken of the project, the engineering and turbine designs, or the architectural design, which latter was alternative with work in the chemical or physical laboratory, and the hours for which do not appear in the time-table. If the numbers of hours actually spent in lecture by students of the three years are added together and divided by three, a number not far from twenty-six is obtained, but it is very disingenuous to insinuate that in the time of previous presidents the students did only twenty-six hours' work a week.

Another effect of the new scheme is said to be the raising of the standard of the entrance examinations. When the College was first opened the entrance examination was conducted by the Civil Service Commissioners; later, when it was opened to all students who desired to present themselves in order to compete for the Indian appointments in the College itself, the examinations were carried on at the College by some members of the staff, and the number of the candidates was often less than the vacancies. As the order has always been given to the presidents to make the College "pay," there was a tendency to admit as many as possible, so as to fill the building. Of late years the number of candidates has exceeded the vacancies, and the examination has been selective, to the great satisfaction of the staff, who thus have better material with which to work. This stiffening of the examinations has been going on for some time, and is quite independent of the recent dismissals or of Colonel Ottley's report.

Another very misleading statement is that 39 per cent. of the students fail; this is made so as to infer that the teaching is inefficient. This number has probably been arrived at by counting the number of students who enter in one year, and the number of the same batch who obtain diplomas at the end of the third year; but no account appears to have been taken of the fact that many students withdraw of their own accord before completing their college course.

The statement that outside examiners would be appointed might induce a casual reader to suppose that the examinations are carried out by the teachers themselves, as, indeed, the *Times* categorically states, "the teachers were also examiners with no one from the outside." This is erroneous; outside examiners have always been the rule; a large proportion of the marks are given by outsiders, and in some subjects as much as half of the marks are so awarded. The outside examiners are absolutely independent; their papers are not seen by the lecturers.

Extracts of the reports of these examiners are read by the president on the prize day.

What we have stated above quite supports Lord Kelvin's expression of disappointment at the reply vouchsafed to the deputation.

It appears also, from Lord George Hamilton's reply, that he does not consider the men of science employed at Coopers Hill to be servants of the Crown, and that consequently a different measure is to be meted out to them than that proper to the unscientific clerks in a department of the India Office. He is reported to have said that the age limit of the professors at the College is sixty; surely, under the Superannuation Act of 1859, it is sixty-five, and the professor may continue in office until seventy if the president certifies that the work is being efficiently performed.

Under the same Act, if it were desired to reörganise the College, there was a regulated way open which, beyond all question, would be the one employed in any reorganisation of the India Office itself; and surely under these circumstances it was the duty of the representatives of science to ask for simple justice. Chap. VII. of the Superannuation Act runs as follows:—

"It shall be lawful for the Commissioners of the Treasury to grant to any person retiring or removed from the public service in consequence of the abolition of his office, or for the purpose of facilitating improvements in the organisation of the department to which he belongs, by which greater efficiency and economy can be effected, such special annual allowance by way of compensation as on a full consideration of the circumstances of the case may seem to the said Commissioners to be a reasonable and just compensation for the loss of office; and if the compensation shall exceed the amount to which such person would have been entitled under the scale of superannuation provided by this Act *if ten years were added to the number of years which he may have actually served*, such allowance shall be granted by special minute, stating the special grounds for granting such allowance, which minute shall be laid before Parliament, and no such allowance shall exceed two-thirds of the salary and emoluments of the office."

Another point that the noble lord appears to have omitted to answer is Prof. Johnstone-Stoney's contention that the dismissals were not even in accordance with the terms of appointment.

If the above assertions are true, and we have every reason to believe that they are, is it surprising that the dismissed members of the staff should ask for further inquiry? And it is only natural that others, as represented by the signatories of the memorial presented on Tuesday week, should wish to support their application. It would appear that the inquiry is even more urgently needed since we have heard Lord George Hamilton's reply.

But the condition of the staff at Coopers Hill is only a small part of a large question, and the memorialists are quite justified in saying that "such dismissals are likely to affect adversely the cause of scientific teaching in the United Kingdom." An action of this kind by a Government department will not tend to raise the dignity of scientific teaching in the eyes of the general public, and unless England is to fall far behind other countries it is essential that due regard be paid to those fundamental subjects of science on which the welfare of the whole community depends.

All interested in English education, and we may add that their number now includes the more intelligent of our manufacturers, know full well that the rapid strides now being made by American and German engineers are due to a gradual perfecting of the welding of science to practice. In America, a four years' course, including both the science and art of engineering, is the rule in the engineering colleges. The engineering department of the University of Birmingham starts with a four years' course in which those subjects which have been summarily and, as we hold, unwisely, ejected from the Coopers Hill curriculum will hold a large place.

Lord George Hamilton now knows what the representatives of English science think of the proposals for which he is responsible. The opinion of the professional electrical engineers of this country will be gathered from the following comments upon the case, which appeared in last week's *Electrician*:—"The crucial question, therefore, is whether the proposed changes will enable the College to turn out better engineers. What, then, are these changes? They involve the abolition of the chairs of physics, chemistry, hydraulic engineering and mechanism, the assistant professorship of engineering, the lectureship in accounts, the demonstratorships in the mechanical laboratory and in physics, and the instructorship in electrical engineering. The selection is amazing! What sort of engineering college training can it be that can dispense with a teacher for any one of these subjects? And, considering that the supply of telegraph engineers has been one of the chief features of the College, how are we to regard patiently the abolition of the professorship of physics and the instructorship in electrical engineering? This is economy false to the core—so palpably absurd, indeed, that we doubt if economy is the real reason for these startling changes. Lord George Hamilton stated that in the revised curriculum 'electricity would be thoroughly taught,' as Sir William Preece had advised them that 'a demonstrator was capable of giving all the necessary instruction.' We entirely dissent from this view; with the rapid increase in the engineering applications of electricity, not less but *far more* instruction in electrical and allied subjects becomes increasingly necessary in any engineering college."

Of one thing we may rest assured. When the Indian engineers only know chemistry "to the extent required to enable the engineer to interpret results given by professional chemists," as quoted from the official documents by Lord Kelvin; and physics and electrical science as imparted by Sir William Preece's "demonstrator"; the reputation of a noble service, which has during the last quarter of a century achieved such admirable results, will soon be a thing of the past.

NOTES.

WE have received the following circular relative to the dismissals at Coopers Hill College. "In consequence of the unsatisfactory nature of Lord George Hamilton's reply to the deputation which waited upon him on Tuesday, February 12, to present the memorial relating to the dismissals at Coopers Hill, it has become necessary to take action in Parliament. It would be of great service if the signatories to the memorial would draw the attention of their local Member of Parliament to the action of the Secretary of State for India, and ask him to interest himself in the matter when it comes before the House. A copy of the memorial will be forwarded to any signatory on application to The Secretary, The Museums, Cambridge."

AN abstract of an interim report on yellow fever, by Dr. Durham and the late Dr. Myers, has been received by the Liverpool School of Tropical Medicine. The abstract mentions that a small bacillus has been found in the internal organs of those dead of yellow fever. From the fact that this bacillus has been found constantly and in apparently "pure cultures," it is concluded that there is good reason to suppose it to be the cause of the disease, but at the same time the need of more experimental work to establish the claim is recognised. Careful search was made for parasites of the nature of protozoa, but the observers conclude that yellow fever is not caused by that class of parasite.